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(54) Vehicle security systems

(57) A system in which the vehicle carries a device (figure 1) for paging the vehicle owner if the vehicle is unlawfully interfered with and the owner is equipped with a portable response device (figure 2) for responding to the vehicle device. The response device transmits a pager message to the vehicle device upon receipt of a warning from the vehicle device and after owner acknowledgement (by activating a switch on the response device). The vehicle device activates a radio tracker upon detection of this signal and may also activate an audible or visual alarm or an immobiliser. Coded signals may be used between the two devices.

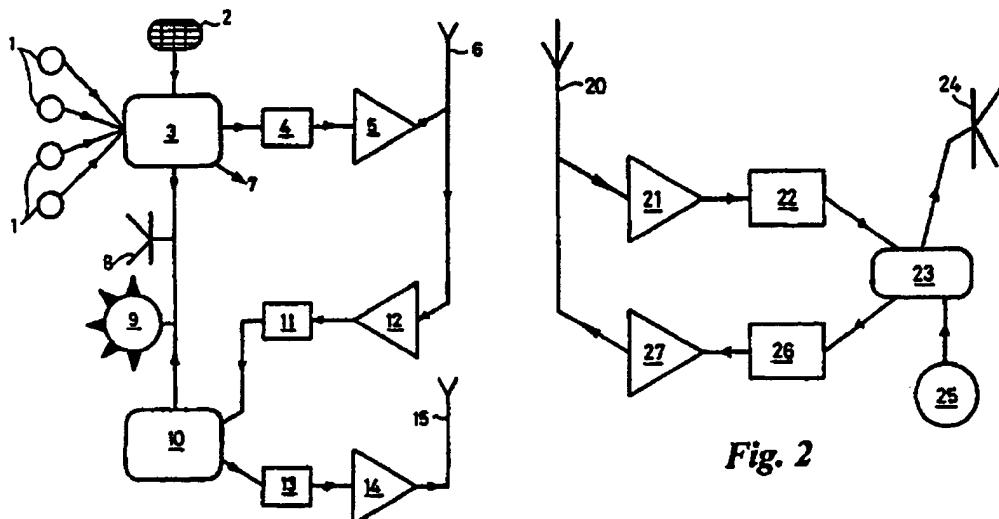


Fig. 1

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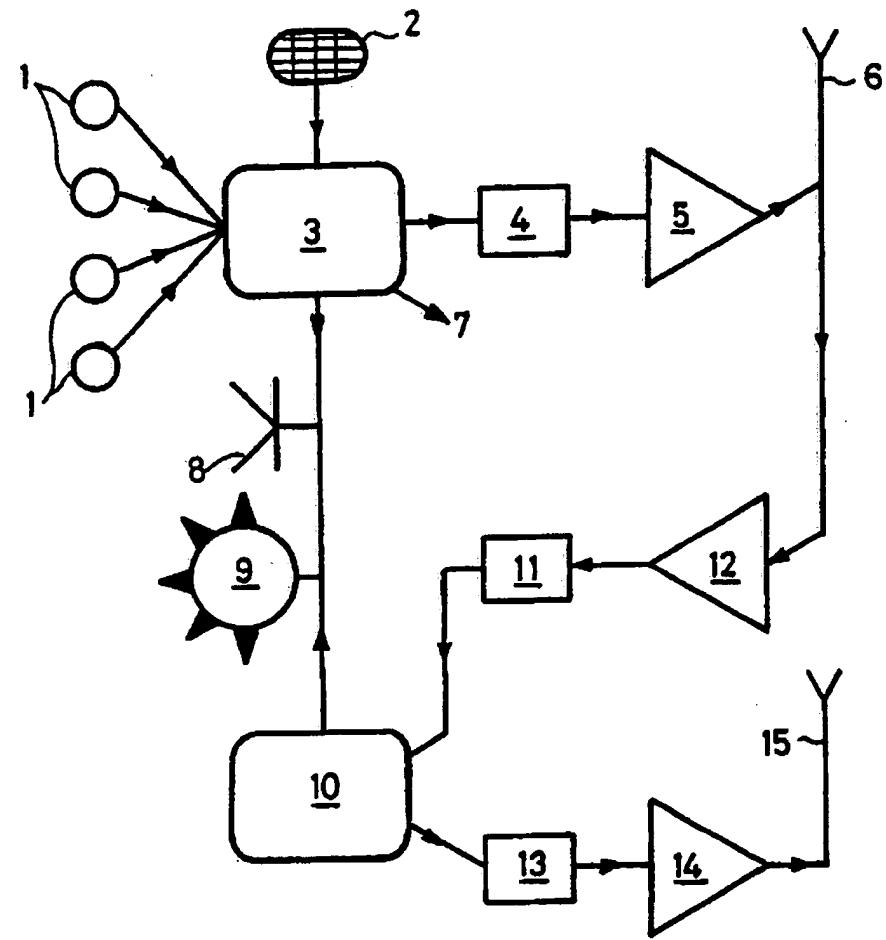


Fig. 1

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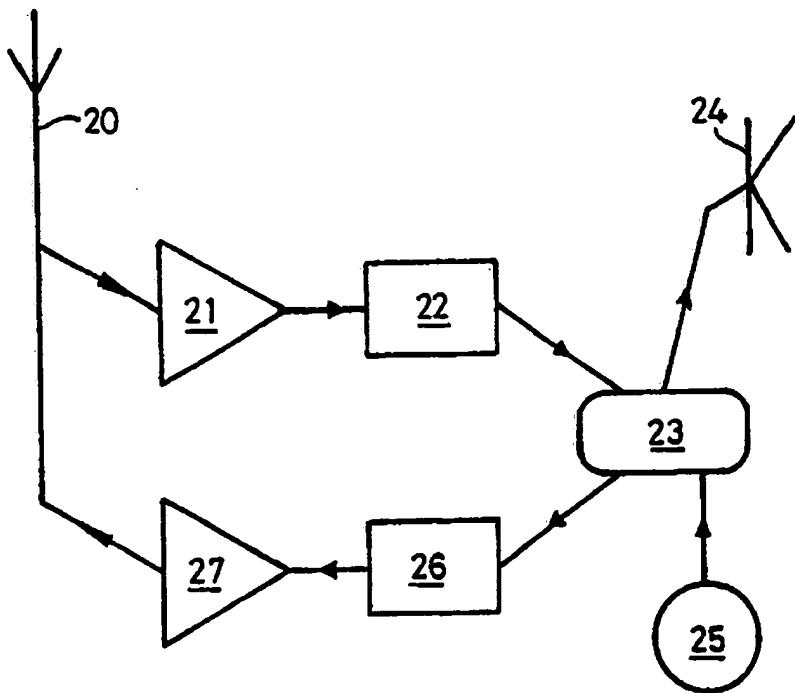


Fig. 2

Improvements in Vehicle Security Systems

This invention relates to a vehicle security system.

Various security systems for vehicles are well known.

Generally, an audible alarm is triggered, when the alarm

5 is set, for example in response to physical disturbance of
the vehicle, the opening of a door, and/or change in the
air pressure within the vehicle. However, once a
professional thief has immobilised the alarm, by-passed
the ignition and driven the vehicle away, the chances of
10 recovery of the vehicle are relatively slim.

In an endeavour to overcome this problem, it is known to

provide the vehicle with a radio tracker, which transmits
a VHF radio signal capable of being picked up by police

15 cars having a suitable tracking receiver. The radio
transmission enables the stolen vehicle to be tracked and
often eventually recovered. This known system is
effective but expensive, and involves the services of a
tracking company capable of activating the radio tracker
20 when informed by the vehicle owner (or driver) that the
vehicle has been stolen. Thus, in many instances, a long
delay will occur, after the theft has actually taken place,
before the radio tracker is activated.

25 According to the invention, there is provided a vehicle
alarm system comprising, for mounting in the vehicle, a
device including a transceiver including a signal-
transmitting paging device and means for activating
the paging device in the event of unauthorised entry to
30 or use of the vehicle, and a portable device including a

receiver adapted to be carried by the owner and responsive to a paging signal to produce an alarm signal which alerts the vehicle owner or driver to a possible theft of the vehicle, the owner device including a

- 5 response-signal transmitter, and the vehicle device including response-signal receiver and means able to activate a radio tracker on board the vehicle when a response signal is received.
- 10 The term "vehicle", as used herein, is intended to be broadly interpreted to cover motor cars, lorries, trailers such as goods-carrying trailers and caravans, and also sea-going vehicles such as motor cruisers and yachts.

- 15 The term "owner", as used herein, means the owner or other person in charge of the vehicle at the time.

As both the vehicle device and the owner device incorporate both a transmitter and a receiver, these may be in the form
20 of transceivers.

The invention enables a radio tracker in the vehicle to be activated by a signal sent out by the owner alerted by the paging signal. At the same time, the owner can
25 inform the police of the theft and give all relevant particulars, possibly including information relating to the signal being transmitted from the stolen vehicle. Alternatively, the owner may advise a tracking company of the theft, in accordance with the known tracking system.

30 The vehicle may also incorporate a hidden immobilisation switch operable by the response signal sent out by an alerted vehicle owner. This immobilisation switch may be connected in the vehicle ignition circuit, but could

alternatively be located, for example, in the fuel feed.

The vehicle paging device may also be associated with an alarm circuit of the kind which also provides an audible 5 alarm of any one of the various known available kinds.

The invention has the advantage that the vehicle owner is able to take action responsive to the vehicle theft immediately, instead of no action being taken until the 10 owner uncovers the theft.

However, in all cases, it is possible for the owner to check that the received paging signal is not a false alarm and that the vehicle has in fact been stolen before notifying 15 the police of the fact.

One possible application of the invention is in the trailer unit of an articulated vehicle having a security system of the kind described in U.K. Patent Application No. 9319476.9. 20 This security system includes alarm circuitry incorporating an alarm which is activated if an attempt is made to raise the trailer ground support in an unauthorised manner when the tractor unit is disconnected. In such a security system, the alarm circuitry may be associated with a 25 paging device in accordance with the present invention, and the vehicle owner equipped with a transceiver in accordance with the invention.

The vehicle owner's portable receiver or transceiver can 30 be very small, for example being incorporated in a tag carried by a key ring to which the owner can also attach the vehicle key or keys. The device is required essentially to incorporate, in addition to simple trans- ceiver circuitry and a small battery, an audible or

visible alarm and a small switch operable to cause a radio response signal to be transmitted to the vehicle.

It is obviously desirable, when a paging signal is transmitted at a given frequency F_o available for localised radio transmission, for the owner of the particular vehicle which has been interfered with to be alerted and not other owners in the neighbourhood, typically within a radial distance of at most a few miles from the vehicle, also to be alerted. Most preferably, therefore, the paging signal is transmitted at frequency F_o through an encoding device which in effect adds an owner-unique code to the signal and, at the owner device, the received signal is decoded and its code verified before the alarm device is activated. The alarm device is only activated if the code unique to that vehicle and owner is detected.

Correspondingly, the radio response signal sent on command from the vehicle owner to the vehicle is analogously coded, and the response signal decoded on board the vehicle to verify the code before a vehicle tracker and/or visual or audio alarm device and/or vehicle immobilisation device is or are operated. Most preferably, the paging signal code and the response signal code are different.

A third code is preferably employed when the vehicle tracker is operated to transmit a radio signal, at a different frequency preferably of much longer range, to pinpoint the vehicle to the police and/or security personnel. The third code may be such that it can be utilised by the police and/or security personnel to identify details of the vehicle and owner including, for

example, the make, colour and registration number of the vehicle.

In one example of practice of the invention, a security system in a car, in addition to an audible alarm device and a light flasher, incorporates a radio pager which is simultaneously operated. The pager transmits a unique signal which is received by a transceiver incorporated in the owner's key ring. A small audible alarm in the key ring transceiver alerts the owner of a possible car theft.

Optionally after checking that a vehicle theft has in fact taken place, the owner depresses a small switch on the transceiver, which causes a signal to be transmitted back to a radio tracking device hidden in the vehicle. The owner then telephones the police or security personnel to inform them of the theft and advises them of the particulars necessary to enable them to track the stolen vehicle.

The invention is further described with reference to the accompanying drawings, in which:-

Figure 1 is a functional circuit diagram of pager and tracker circuitry on board the vehicle; and

Figure 2 is a functional circuit diagram of the vehicle owner's transceiver.

It is to be noted that Figures 1 and 2 are functional diagrams given for explanatory purposes; in both cases, many components may be combined within a printed circuit or microchip for economy both in space and cost.

Referring first to Figure 1, the illustrated circuit

comprises and operates as follows:-

A control panel 2 is used to arm and disarm a control circuit 3 as well as enable the entry of security codes

- 5 (pin number) and other commands by the user (vehicle owner). A set of sensors 1 detect any abnormal condition and at the vehicle signal the control circuit 3, which, if already "armed" via the control panel 2, activates encoder 4 to send a unique identity code "a" to radio transmitter 5. The radio transmitter 5 sends an "a" coded radio signal at frequency "A" to aerial 6 which then broadcasts this alarm signal "Aa" to the user. This alarm transmission is repeated at regular intervals until answered by the user's transceiver (Figure 2) or cancelled
10 from the control panel 2. In between transmissions receiver 14 is listening for any reply; the shared aerial 6 is switched between the transmitter 5 and the receiver 12 as appropriate.

- 20 Referring now to Figure 2, namely the user's transceiver:-

The aerial 20 receives the signal "Aa", which is passed to radio receiver 21 and decoded by decoder 22 for comparison with the built-in code "a". If the codes

- 25 match this information is passed to control circuit 23 which activates buzzer/light 24. The user now determines what action to take and, if this is to raise the main alarm, the user presses button 25, which causes the control circuit 23 to activate encoder 26 to send a
30 unique identity code "b" to radio transmitter 27. The radio transmitter 27 sends the "b" coded radio signal at frequency "A" to aerial 20, which then broadcasts this command signal "Ab" to the vehicle. This command transmission is repeated a set number of times for one

press of the button 25.

Referring back to Figure 1, namely the vehicle circuit:-

- 5 The aerial 6 receives the signal "Ab" which is passed to the radio receiver 12, and decoded by decoder 11 for comparison with the built-in code "b". If the codes match this information is passed to control circuit 10 which activates the encoder 13 to send a unique identity code "c" to radio transmitter 14. The radio transmitter 14 sends a coded radio signal at frequency "B" to aerial 15 which then broadcasts this alarm signal "Bc" to receivers used by the police or security personnel.
- 10 The local audio sounder 8, visual indicators 9 and control output 7 can be activated by either of the control circuits 3 or 10 according to preset criteria and the input from the control panel 2. The control output 7 may be used to operate security mechanisms such as locks, extinguishers or engine cutouts, etc.
- 15

Claims

1. A vehicle alarm system comprising, for mounting in the vehicle, a device including a transceiver including a signal-transmitting paging device and means for activating the paging device in the event of unauthorised entry to or use of the vehicle, and a portable device including a receiver adapted to be carried by the owner and responsive to a paging signal to produce an alarm signal which alerts the vehicle owner or driver to a possible theft of the vehicle, the owner device including a response-signal transmitter, and the vehicle device including response-signal receiver and means able to activate a radio tracker on board the vehicle when a response signal is received.
- 15 2. A system according to claim 1, wherein the vehicle incorporates a hidden immobilisation switch operable by the response signal sent out by an alerted vehicle owner.
- 20 3. A system according to claim 1 or claim 2, wherein the paging device is associated with an alarm circuit of the kind which also provides an audible alarm of any one of the various known available kinds.
- 25 4. A system according to any of claims 1 to 3, wherein the owner device comprises a transceiver, a battery, an audible/visible alarm and a switch operable to initiate transmission of a radio response signal.
- 30 5. A system according to any of claims 1 to 4, wherein the paging signal incorporates a unique code accepted only by a decoder in the owner device appertaining to the owner of the vehicle from which the paging signal is transmitted.

6. A system according to claim 5, wherein the response signal incorporates a unique code accepted only by a decoder in the vehicle device appertaining to the vehicle of the owner from which the response signal is transmitted.
- 5
7. A system according to claim 6, in which the paging and response signals are transmitted at the same frequency but with differing codes incorporated.
- 10 8. A system according to any of claims 5 to 7, wherein the tracker signal, when transmitted, incorporates a code unique to the vehicle from which the tracker signal is transmitted.
- 15 9. A system according to claim 8, wherein the tracker signal is transmitted at a frequency different from that of the paging and response signals and with a unique code different from the codes of the paging and tracker signals.
- 20
10. A system according to any of claims 1 to 9, applied to an articulated vehicle trailer having a security system activated if an attempt is made to raise the trailer ground support when the tractor unit is
- 25 disconnected, wherein the said security system is equipped with paging and tracker devices and the vehicle driver is equipped with a response device.
11. A vehicle security system substantially as herein-
30 before described with reference to the accompanying drawings.

10

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(the Search report)

Application number
GB 9500217.6

Relevant Technical Fields		Search Examiner P S DERRY
(i) UK Cl (Ed.N)	G4N (NHVX), H4D (DAA, DBR, DPAA, DPAB, DPAC, DPAX)	
(ii) Int Cl (Ed.6)	B60R 25/10	Date of completion of Search 28 MARCH 1995
Databases (see below)		Documents considered relevant following a search in respect of Claims :- 1-10
(ii) ONLINE - WPI		

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|----|---|----|---|
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| Y: | Document indicating lack of inventive step if combined with one or more other documents of the same category. | E: | Patent document published on or after, but with priority date earlier than, the filing date of the present application. |
| A: | Document indicating technological background and/or state of the art. | &: | Member of the same patent family; corresponding document. |

Category	Identity of document and relevant passages			Relevant to claim(s)
X	EP 0588699 A1	(GILBERT)		1 at least
X	US 3703714	(ANDREWS)		1 at least

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